Northeast Urban Expansion Area, Neighbourhood #2 Concept Plan – Swift Current

Prepared for:
The City of Swift Current

Prepared by:
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Sign-off Sheet

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1.0 INTRODUCTION

1.1 CONCEPT PLAN AREA

The Neighbourhood 2 Concept Plan (NH2CP) and supporting documentation establishes a conceptual framework for Swift Current's next neighbourhood in the Northeast Urban Expansion Area (NEUEA). The NH2CP identifies the design and distribution of land uses, integration with surrounding areas, and a servicing strategy for water distribution, sanitary sewer system, storm water management, and a park and open space network.

This NH2CP will:

1. Provide City Council, Civic Administration, utility agencies, school boards, and other stakeholders with the neighbourhood layout to enable for the timely planning and provision of services;
2. Establish land use patterns and development density for the neighbourhood;
3. Establish a transportation system that will provide for convenient and safe vehicular, transit, pedestrian and cyclist movement in the neighbourhood; and
4. Establish an open space network connecting to adjacent areas.

1.2 LOCATION

The NH2CP is located in the northeast quadrant of the City of Swift Current. The NH2CP is bounded to the east by the eastern boundary of SW Sec. 6, Twp. 16, Rng. 13, W3M; to the south by Memorial Drive; to the north by the northern boundary of SW Sec. 6, Twp. 16, Rng. 13, W3M; and to the west by Highway #4. The NH2CP is 62.18 ha. The NH2CP is identified as Phase 2 in the NEUA Sector Plan.

Adjacent land uses:

East: Neighbourhood #1 in the NEUA which includes residential development, park space, and the Swift Current Integrated Facility (SCIF).

South: Springs Valley Commercial consisting of various commercial developments.

West: Undisturbed pasture land, power line, and creek. This land is in the RM of Swift Current.

North: Undisturbed pasture land and power line. This land is in the RM of Swift Current.

1.3 JURISDICTION

The NH2CP area was part of a large annexation into the City of Swift Current. The annexation was approved by the Saskatchewan Ministry of Municipal Affairs in August of 2011. The lands were previously under the jurisdiction of the RM of Swift Current.

1.4 OWNERSHIP

The land identified as NH2CP (Parcel Number 143266350) is owned jointly by Westbridge Capital Ltd. (15%) and Western Horizons Land Income Trust (85%) and managed by TerraTrust Inc. pursuant to an Administration agreement.

1.5 TIMELINE

It is our intent to gain approval of the NH2CP in the spring of 2016. Subsequent to approval, we will proceed with subdivision and rezoning. The preliminary timeline for construction is to begin earthworks in the summer of 2016.

2.0 POLICY CONTEXT

2.1 OFFICIAL COMMUNITY PLAN

The City's Development Plan (Bylaw No. 3-2003) is an overarching city-wide policy document adopted by City Council that guides growth, development, servicing, and other important issues across the city. As per the Development Plan, an Area Sector Plan has been prepared for the Northeast quadrant of Swift Current. The NH2CP generally follows the vision for Phase 2 outlined in the NEUEA Sector Plan.

2.2 NORTHEAST URBAN EXPANSION AREA SECTOR PLAN

The NEUEA is a largely undeveloped area to the north and east of Highway No. 4 (Memorial Drive) that encompasses approximately 437 hectares (1080 acres). Approximately 266 hectares (660 acres) of this area was part of an annexation approved by the Saskatchewan Ministry of Municipal Affairs from the R.M. of Swift Current. This area is bounded on its west by Highway No. 4, and Highway No. 1 passes through the area's southeast corner.

The NEUEA outlines key elements which will make the area a 'complete community'. These elements are listed below, followed by a brief rationale for each regarding how the NH2CP applies:

- Foster distinct, attractive and active residential communities with a strong sense of place.
    - The NH2CP is designed to be an attractive, residential community which focuses on a central activity node and corridor to create a strong sense of place.
- Create walkable environments.
    - Walkability is encouraged by the modified grid design and a series of parks.
- Facilitate a wide range of transportation options.
    - The NH2CP encourages alternate modes of transportation including walking, cycling, and transit.
- Provide safe and direct connections between key attractors.
    - Pedestrians, cyclists, and transit users will be well connected between residential areas and key attractors.
- Provide access to a variety of public open spaces.
    - All residents within the NH2CP will be within a five minute walking distance to a public open space.
- Support compact, mixed use development.
    - In addition to proposed mixed use parcels, the NH2CP incorporates street townhouses, dwelling group townhouses, and apartment style condominiums. The NH2CP also contains small lot single detached homes, providing individuals or families a more affordable detached housing option.
- Create a range of housing opportunities and choices.
    - The NH2CP design includes single family, street townhouse, dwelling group townhouse, live/work dwellings, and apartment style condominiums.

- Preserve open space, agricultural land, natural beauty and critical environmental areas.
    - Natural topography was utilized for the design of the NH2CP, capturing optimal views and north south property orientation when possible. There are no known critical environmental areas in the NH2CP.
- Utilize (where possible) green infrastructure and buildings.
    - Overland drainage and detention/retention ponds are used in the NH2CP to mitigate the amount of underground infrastructure required.

2.3 HOUSING PLAN

The City of Swift Current has a Housing Plan which was created in November, 2012. The plan outlines the current housing situation and identifies target housing strategies. Applicable key strategies from the plan are outlined below, accompanied by a brief response explaining how the NH2CP complies.

- Plan for neighbourhoods that include ownership, rental and mixed density of housing.
    - The NH2CP includes a mix of density ranging from low density to high density, including mixed use. At this time, the developer does not have a target ownership/rental mix, however, discussions with builders and analyzing market conditions will further determine the most logical approach.
- Appropriately phase residential development to support an adequate supply and mix of serviced and appropriately zoned land.
    - A phasing plan is appended to the report. While the intent is to supply an adequate supply and mix of serviced and appropriately zoned land, the phasing initially is determined by servicing connections. Once the development is underway, the developer will produce phases according to an appropriate mix of housing and market demand.
- Engage housing stakeholders, including the development sector, in comprehensive planning of community neighbourhoods.
    - The developer has held discussions with local builders to gather ideas of the local market needs. Additionally, as part of the concept plan approval process, the developer is prepared to participate in open houses to gather feedback from the public and stakeholders.
- Market the housing demands of targeted demographic groups and encourage the development sector to respond to identified needs.
    - The NH2CP proposes many different types of land uses and densities which can accommodate all demographic groups. For example, there are several Group Townhouse sites which could be developed as senior living complexes if the market warrants it.
- Rezone land for higher density residential development.
    - The NH2CP proposes 6.5 ha of townhouse development, 2.18 ha of high density residential development and 5.82 ha of mixed use development. Zoning amendments may be proposed as the market changes.

3.0 SITE INVENTORY & ANALYSIS OBJECTIVE

The NH2CP area has no buildings or structures on it. Some of the land is cultivated for agricultural purposes with the remainder undisturbed pasture. Adjacent land uses include agricultural pasture land to the north, residential and institutional development to the east, Highway 4 and commercial development to the south, and agricultural pasture land to the west.

The NH2CP area contains evidence of run off from the topographic high terrain in the northwest, in a meandering ephemeral channel that historically crossed the south portion of the site. The ephemeral channel, which historically drained into Swift Current Creek, appears to have been interrupted by the development of Highway 4. The remnants of the channel are still observed on the site.

3.1 ENVIRONMENTAL ASSESSMENT

A Phase 1 Environmental Assessment (ESA) was completed by Stantec in February of 2015. The Phase I ESA has revealed no evidence of environmental contamination associated with the Site; however, aerial photographs of the Site reveal what appear to be stockpiles near the center of the Site between approximately 1955 and 1977. Details of the stockpiles are unknown to Stantec and no visual evidence of contamination was apparent at the time of the Site visit. No testing for potential environmental impacts associated with the historic stockpiles has been conducted in the Phase I ESA. If contamination is encountered during future work at the Site, Stantec recommends that it be assessed at that time. The Phase 1 ESA can be found in Appendix C.

3.2 GEOTECHNICAL INVESTIGATION

A preliminary Geotechnical Investigation was completed by Machibroda Engineering Ltd. in May of 2015. Sixteen, 150 mm diameter test holes were dry drilled using a truck-mounted, continuous flight auger drill rig. Field drill logs were compiled for the Test Holes during test drilling which, were believed to be representative of the subsurface conditions at the Test Hole locations at the time of test drilling. No detectable evidence (odour or staining) of environmentally sensitive materials was detected during the actual time of the field test drilling program. The full Geotechnical Investigation can be found in Appendix D.

3.3 HERITAGE

An Environmental and Heritage Screening Report was completed by AECOM in February, 2012, for the NEUEA. The Heritage Conservation Branch (HCB) provided a review of the NEUEA noting that all but one quarter section are considered heritage sensitive, and may be required to undergo a Heritage Resource Impact Assessment (HRIA). The NH2CP was identified as a quarter section which is heritage sensitive, but does not have known archaeological sites present. Stantec has since provided the NH2CP to the HCB for review. The HCB responded on February 9, 2016, stating that an HRIA is required only for the native prairie land located in the northern portion of the quarter section. The developer will complete an HRIA for this portion, however at this time it is our intent to gain concept plan approval for the entire quarter section. Construction on the native prairie land will not occur until the HRIA is completed and mitigation measures are agreed upon. The HCB letter can be found in the Appendix.

4.0 LAND USE STRATEGY OBJECTIVES

4.1 DESIGN PRINCIPLES

Respect for Context

A new neighbourhood must fit seamlessly into its surroundings with a network and pattern that interconnects with the larger community.

Complete & Resilient

A broad variety and mix of uses that work together— including a range of housing options and prices to accommodate a diverse demographic. Residential development needs services and amenities (including parks and commercial) to foster a more complete, resilient and healthy neighbourhood.

Compact & Walkable

Efficient land use requires a sustainable density, with services and amenities accessible on a pedestrian-friendly system promoting health and interaction. Housing options should include invisible (secondary suites) and gentle (townhouses) density choices allowing persons to age in place along the needs and affordability continuum of housing.

Interconnected Networks

A modified grid pattern of streets (supplemented by pedestrian connections and multi-use trails) provides a balanced neighbourhood design with logical and safe walking and cycling paths.

In Harmony with Nature

It is critical to maintain and protect valuable natural features with open spaces, parks, boulevards and corridors to create an integrated, looped and connected system—connecting the community with nature, fostering biodiversity, optimizing the tree canopy, and providing recreation.

A Sense of Place

Neighbourhoods need a unique and exceptional community character, in both built form and public realm, which residents will cherish. This requires an emphasis on street orientation place-making and high quality urban design for public spaces.

4.2 THE CONCEPT PLAN

The NH2CP provides a range of housing types and densities in close proximity to neighbourhood and highway commercial amenities. The modified grid pattern facilitates pedestrian access to the Neighbourhood Activity Centre (NAC), park space, recreational facilities, and commercial areas. The NH2CP is designed to fit seamlessly with the overall NEUAE Sector Plan.

The NH2CP breakdown of land uses is provided in Table 4.1 below.

Table 4.1: Land Use Statistics

Swift Current NH2CP Land Use Statistics							
Land Use	**Hectares**	**Acres**	**%**	**Units/Acre**	**Units**	**People/Unit**	**Population**
Residential Low Density	21.89	54.07	35.2%	8	433	2.8	1,211
Low Density Multi-Unit (Group Townhouse)	6.00	14.82	9.6%	20	296	2.2	652
Low Density Multi-Unit (Street Townhouse)	0.50	1.24	0.8%	20	25	2.2	54
High Density Multi-Unit	2.18	5.38	3.5%	40	215	1.6	345
Total	**30.57**	**75.51**	**49.2%**		**969**		**2,262**
Highway Commercial	**5.85**	**14.45**	**9.4%**				
Mixed Use	**5.82**	**14.38**	**9.4%**	**20**	**288**	**1.8**	**518**
Bio Swale	**0.72**	**1.78**	**1.2%**				
Municipal Reserve	**5.76**	**14.23**	**9.3%**				
Buffer Strip	**0.41**	**1.01**	**0.7%**				
Stormwater Detention / Utility Easement	**1.24**	**3.06**	**2.0%**				
Roadways	**11.81**	**29.17**	**19.0%**				
Total	**62.18**	**153.58**	**100%**		**1,257**		**2,780**

The SCIF provides institutional uses such as schools, library, regional hospital, long term care home, and multi-purpose recreational complex. The SCIF is located directly east of the neighbourhood and providing multiple access options was critical in the design process.

As outlined in the NEUEA Sector Plan, Springs Drive from Memorial Drive to Douglas Road is identified as a Neighbourhood Activity Corridor (NACo). The NH2CP deviates slightly by situating the NACo in an east/west location accessed from Springs Drive. This area of the neighbourhood provides a variety of housing options and commercial opportunities.

The Neighbourhood Activity Centre (NAC) is located west of Springs Drive, on the north side of the NACo. This area of the plan is the focal point of the neighbourhood. It provides a mix of uses including commercial, institutional, and residential adjacent to the NAC. The mix of uses creates a strong sense of place. The NAC is designed to be connected to the surrounding residential and the SCIF by a network of converging streets, walkways, and multi-use paths.

4.3 LAND USES

Residential

Residential development offers a combination of low, medium, and high density housing options to provide a variety of purchase prices. Low density residential uses include single detached dwellings on a variety of lot widths to accommodate different sizes and styles of units. Medium

density residential uses include row housing oriented towards the street or on a site basis in dwelling groups. High density residential uses include low-rise apartment buildings and stacked townhouses.

A combination of housing forms, types, and densities are included throughout the NH2CP to encourage a strong social and economic mix, accommodate a diverse demographic, and allow individuals to age in place. The higher density forms are allocated adjacent to the NACo and NAC to provide a critical mass of residents within walking or cycling distance to commercial services.

Mixed-Use

Mixed use developments are located along the NACo. These sites provide a combination of commercial, institutional, and residential uses. The mixed use designation provides a live – work opportunity in the NH2CP. There are 5.82 hectares of mixed use development proposed for the NH2CP.

Between the mixed use and highway commercial is a proposed landscaped cross access parking area. This feature will provide adequate parking for both land uses, expand the naturalized drainage swale with tree plantings, and safe pedestrian swale crossings to access the mixed use highway commercial uses.

Utilities servicing the highway commercial development are proposed as easements directed through the parking lot. Further details can be found in the preliminary site plan appended to this report.

Commercial

Commercial uses are located in the south of the NH2CP along Memorial Drive and Highway 4. The commercial area is accessible from Memorial Drive via Springs Gate and Springs Drive from the north and south. Internal connectivity to the commercial area allows for a variety of access routes within the NH2CP. Commercial uses will be incorporated in the ground floor of the mixed-use developments. The commercial development will provide everyday essentials for residents. Additionally, there are opportunities for restaurant and café culture in the heart of the NH2CP. There are 5.85 hectares proposed for Highway Commercial development.

Parks & Open Space

Parks and open spaces provide linkages throughout the NH2CP, to adjacent neighbourhoods, and to the SCIF. Linear parks, separated multi-use pathways, and sidewalks facilitate pedestrian access throughout the NH2CP. Linear parks connect open spaces throughout the NH2CP and to the high level pedestrian network in the NEUAE Sector Plan.

Municipal Reserve (MR) dedication is calculated using 10% of residential areas and 5% of non-residential areas (less buffers and storm water detention areas). The total municipal reserve displayed in the NH2CP is 5.76 hectares. Buffer Strips and Storm Water detention areas also form part of the Park and Open Space network but are not calculated as Municipal Reserve. It is the developer's intent to discuss MR requirements further with the City of Swift Current and make adjustments accordingly.

The public square in the NAC is the main public gathering space in the NH2CP. The public square is adjacent to active mixed use buildings within the NACo and the NAC. It is easily accessible by vehicular, pedestrian, cycling, and potentially transit modes. The public square is linked to the central MR.

Drainage Swales

There are two proposed drainage swales in the NH2CP. The first, identified as the 'Residential Drainage Swale', conveys water from Douglas Drive southward to the proposed pond on the west side of the development. The second, identified as the 'Commercial Drainage Swale', conveys water from Springs Gate eastward to the proposed pond just east of the southeast corner of the NH2CP.

The purpose of the swales is conveyance of stormwater runoff. For this development, the swales have the top level of soils amended to allow a portion of stormwater to infiltrate the soil helping to filter out pollutants as it travels along a 0.5% longitudinal grade. The swales will be seeded with "naturalized" grasses and contain shrub plantings for interest. Additional vegetation, such as cattails, will also establish naturally in areas of increased moisture content. In lieu of the traditional drainage tile, we have included a gravel drainage channel complete with weeping tile that can carry excessive amounts of water towards the outlet in a shorter period of time.

An establishment maintenance period will be required after the swales are constructed and shall continue until the grass areas are fully germinated, showing signs of mature and healthy turf without bare patches. During the establishment period, the swales are to be regularly monitored to identify flat areas or areas of ponding water. Design grades are to be maintained throughout by topdressing and overseeding of bare areas. Throughout the establishment period, temporary watering may be required to encourage germination and growth of the grass areas and all grass areas should be mown as needed as a means of controlling the weed growth. Mowing must not be completed during times where the soil is overly wet or saturated to minimize damage to the swale bottom by maintenance equipment.

After the establishment maintenance period, the long term maintenance requirements on a swale include mowing as needed and seasonal trimming of the vegetation. As a naturalized area, the majority of the grass areas will be a no-mow zone, with the exception of a maintenance strip along the pathway. A maintenance buffer strip of approximately 0.5 m wide shall be cut adjacent to the pathways and will be cut to a 4" height. Noxious weeds should be controlled by a licensed Pesticide Applicator if extensive; however hand pulling of weeds can be completed during regular maintenance visits. When maintenance is being completed, the swale should be monitored for signs of erosion or excessive sedimentation deposits. The accumulation of debris and sedimentation deposits can affect the performance of the swales and can result in lower infiltration of stormwater runoff. However, it is expected vegetation will encroach into the drainage channel over time, resulting in a natural appearance.

In addition to the functionality of each swale, it is important to note the aesthetic appeal and greenery they provide to the development. The residential swale provides a more appealing backyard and off-street pedestrian connectivity. The commercial swale provides supplementary landscaping in the shared parking lot in the commercial and mixed use area.

A cross section for each swale can be found appended to this report.

4.4 SOUND ATTENUATION

A Traffic Noise Assessment (TNA) was completed by Patching Associates on June 10, 2016. The TNA was conducted in accordance with the Canada Mortgage and Housing Corporation Road and Rail Noise: Effects on Housing document.

The standard used by the City of Swift Current Engineering Department gives a noise criteria of 60 dBA L_{eq} for the daytime period of 7:00 to 22:00 and 55 dBA L_{eq} for the nighttime period of 22:00 to 7:00, received at the residential property line. See Appendix A for a detailed explanation of the Leq index.

The results indicate that the noise levels without any noise barriers is expected to exceed the daytime noise criteria for all the receivers and exceed the nighttime noise criteria for some of the receivers in the study area. As such, a noise barrier is required for all the receivers and the results indicate that a barrier height of 1.8m is adequate to meet both the daytime and nighttime noise criteria for all the receivers in the study area.

In light of the TNA, the developer will install a 1.8m high sound barrier that is to be located along the property line and wrap around the two properties at the beginning and at the end of the residential area. The CMHC guide states that it shall have an impervious surface with a negligible number of holes or cracks (less than 0.2 percent of the total surface area). The barrier material should weigh at least 5 kg/m2 to 10 kg/m2.

The complete TNA can be found in the Appendix.

5.0 CIRCULATION STRATEGY

The NH2CP facilitates access and connectivity for vehicles, pedestrians, and cyclists. The following design elements have been incorporated in the NH2CP to accommodate multiple modes of transportation.

5.1 CONNECTIVITY

The NH2CP is located directly east of Highway 4, and directly north of Memorial Drive. Existing roads adjacent to the NH2CP have been utilized in the design. Transportation design will follow the City of Swift Current Design & Development Standards.

Within the NH2CP a hierarchical roadway network has been established to ensure efficient traffic flow and distribute traffic into separate areas. The circulation plan in Appendix A illustrates the existing and proposed roadway classifications within and adjacent to the NH2CP. Accesses are classified as Collector roadways, with a network of local roadways and residential lanes. The right-of-ways for these roads will be in accordance with the Design & Development Standards and will include vertical or rolled curb and gutters, and sidewalks, separated multi-use pathways, and separated bicycle lanes, as outlined in the NEUAE Sector Plan.

There are two accesses to the NH2CP on Memorial Drive at Springs Gate and Springs Drive. Connections to the north and east will be added as development progresses.

A Traffic Impact Study (TIS) was completed and is attached in Appendix B. The TIS shows that the roadway network will be capable of handling the volumes of traffic generated by the development with the following improvements:

- Monitor the intersection of Highway 4 & Memorial Drive following full build out of the development for traffic volumes that warrant signalization.
- Signalize the intersection of Memorial Drive & Springs Gate, and provide a left turn lane and a shared through/right lane in the eastbound direction. All other directions will have a single shared left/through/right lane.
- Signalize the intersection of Memorial Drive & Springs Drive, and convert the current eastbound shared left/through lane and right turn lane to a left turn lane and shared through/right lane. All other directions will have a single shared left/through/right lane.

5.2 PEDESTRIANS & CYCLISTS

Pedestrian and cyclist connections are provided from the surrounding sidewalk/pathways systems into and throughout the NH2CP.

The Parks and Open Space network provides pedestrian and cyclist access throughout the NH2CP. These linkages provide connections to adjacent neighbourhoods and between residential areas and attractions in the public square and commercial areas. The overall modified grid design provides excellent connectivity.

5.3 TRANSIT

Swift Current Transit currently provides one main route throughout the city, which travels eastbound on Memorial Drive. Shuttle service is provided for those located outside walking distance to the main route. Transit service throughout the City of Swift Current may change as it becomes more developed, and increased transit service may be warranted.

6.0 SERVICING STRATEGY OBJECTIVES

6.1 SERVICEABILITY

The servicing strategy section of the NH2CP Report is intended to provide detailed information regarding the level of service, location, sizing, and capacities required for the water distribution, sanitary sewer collection, and stormwater management systems. There is a review of the adequacy of existing public services needed to support the development of the NH2CP. High level assessments of any operational and maintenance implications for the planned services specific to the NH2CP as a result of servicing has been provided.

Limitations of this Report

There are some limitations to the accuracy of the serviceability section of this report. The first involves the stormwater management. It is the intention to use the same storm and infiltration parameters within the storm model that AECOM used for the NEUEA Sector Plan Report. AECOM has released a servicing letter dated July 15, 2015, which outlines the servicing requirements for the NH2CP. The letter can be found in Appendix E. Using the information in this letter we have been able to match storm infiltration parameters to the NEUEA Sector Plan Report. Stantec is now waiting on storm parameters in order to align all aspects of the stormwater design to the NEUEA Sector Plan.

The servicing letter also states that once the water distribution network within the NH2CP has been established, AECOM will provide boundary conditions reflective of the new booster pumping station. This means that once the design is submitted to the City, further analysis and pipe sizing is required for the watermain. The booster pumping station required by this development is currently being designed by AECOM.

6.2 STORMWATER MANAGEMENT

Conceptual Design and Modeling

A conceptual level stormwater management system was developed and provides all major storm pipe sizes as well as the overland flow paths to the proposed storm water detention sites. The model and design follows the City of Swift Current Design and Development Standards as well as the NEUEA Sector Plan Report.

The computer program used to simulate and size the storm drainage system was XPSWMM 2014 Version 15.0. XPSWMM includes the ability for the minor and major drainage systems to be modeled simultaneously such that when the minor system capacity is exceeded, the excess storm water is re-routed through the major system.

6.2.1 Model Setup

The model used for the stormwater concept was based on the NH2CP and the overall NEUEA Sector Plan stormwater plan. The stormwater management system location and the runoff

characteristics are representative of the land uses defined in the NH2CP and the AECOM servicing letter.

Storm Data

The storm data used in the model is from the City of Swift Current Design and Development Standards. The Swift Current design storms used were the four hour, 1-in-5 year storm and the 24 hour AES distribution, 1-in-100 year storm. The 1-in-5 year storm was used to size the minor system and the 1-in-100 year storm was used to size the major overland flow system and Storm Water Storage Basin (SWSB) design. The storms that were used for the initial assessment do not match the storms that were used in the NEUEA Sector Plan Report that defined the stormwater requirements for the NH2CP. It is our intention to match the storm parameters used to create the AECOM model once we have received this information from the City of Swift Current.

Model Inputs

The runoff coefficients for each land use below are taken from the City of Swift Current Design and Development Standards. The runoff coefficients are used to calculate the pervious and impervious percentages which are required for input to the model. Where there was not enough information in the Design and Development Standards for a particular land use, the values were based on land uses for other cities in Saskatchewan. Table 6.1 shows the values for various land uses.

Table 6.1 - Runoff Coefficients

Land Use	Runoff Coefficient	Percent Impervious
Residential	0.30	20.0%
Street Townhouses*	0.45	40.0%
Group Townhouses*	0.45	40.0%
High Density	0.70	73.3%
Mixed Use*	0.65	66.7%
Highway Commercial	0.70	73.3%
Buffer Strip	0.15	0.0%
Parks	0.15	0.0%
Public Square	0.15	0.0%

**Runoff Coefficient provided by City of Saskatoon New Neighbourhood Design and Development Standards Manual, January 2012.*

The parameters for infiltration are based on standards used to create the model for the NEUEA Sector Plan Report using the Horton equation for the pervious area. A list of the runoff and infiltration parameters that were used in the model is provided in Table 6.2. These parameters are based on the AECOM servicing letter outlining the servicing requirements for this quarter section.

Table 6.2 - Runoff and Infiltration Parameters

Component	Parameter	Value
Surface Runoff	Manning's 'n' - Impervious	0.013
	Manning's 'n' - Pervious	0.15
	Depression Storage – Impervious	2.5 mm
	Depression Storage - Pervious	10 mm
Horton's Infiltration Equation	Maximum Infiltration	25.4 mm/hr
	Minimum Infiltration	1.3 mm/hr
	Rate of Decay	0.00110 1/sec
SCS Model for Existing Conditions	SCS Pervious area curve number	84
	Initial Abstraction	20%
	Agricultural Catchment Shape Factor	200

Manning's 'n' values for the roughness of the flow channels were assigned a value of 0.03. The Manning's 'n' for the roughness of pipe was assigned a value of 0.013.

Model Results

The performance of a model is assessed by the resultant continuity error which is a mass balance that compares the water input into the model to the water remaining and leaving the model. Continuity errors of 2% or less are considered excellent. The overall continuity error for the NEUEA storm model was -4.2335% which needs some improvement before detailed design but is sufficient for this level of analysis.

Major system flow in the model is accomplished by overland flow through the streets once the minor storm sewer system has surcharged. The overland flow system was developed with street low points and tip-out depths so the water can be stored, yet ultimately will still travel to the storm water detention sites. A maximum storage depth (tip out depth) of 0.4 meters was used in roadways to accommodate traffic flow. This method of storage has only been considered for roadways at this time and has not been applied to lanes.

The minor system was modeled with a 1-in-5 year storm for Swift Current. Pipe sizes were determined based on flows entering the system and the hydraulic grade line being at or below the crown of the pipe. The conceptual design for the minor storm piping system is shown in Appendix A.

6.2.2 Stormwater Pond Conceptual Design

Preliminary design of the storm water storage pond system has been completed. There are a total of three storm water ponds. Since a minimum normal water elevation surface area of 2.0 hectares is required by the City of Swift Current Design and Development Standards for the approval of a wet pond, all three storm ponds have been designed as dry ponds. Pond names have been assigned based on their catchment area and are intended to operate as part of a larger system. These storm water storage areas are located within park areas which will enhance the open space features of this neighbourhood when they are not being used for storage. Table 6.3 summarizes the pond volume capacities and the water levels.

Table 6.3 – Storm Water Pond Parameters

Pond Name	Active Storage (m^3)	Storage Depth (m)	100 year High Water Level	
			Area (ha)	Elevation (m)
Pond 1	12,870	1.5	0.98	736.99
Pond 2	2,740	1.5	0.22	737.41
Pond 3	14,600	1.5	1.06	733.37
TOTAL	30,210	-	2.26	-

Each of the storm water dry ponds is designed to collect runoff from a small portion of the development and release it at a controlled rate similar to the rate of flow experienced under pre-development conditions.

There is an area to the west of the concept plan that currently flows through the NH2CP towards the Swift Current Creek. Under future conditions this area is designed to flow overland towards an enhanced bio-swale travelling through the NH2CP. This type of conveyance system is intended to increase infiltration and stormwater runoff quality. Another bio-swale is planned to convey flows between the commercial and mixed use parcels toward the south of the NH2CP. This will allow for site developers adjacent to this swale to design green parking lots with a reduced amount of piped conveyance. These additions to the stormwater management system will increase the quality and reduce the quantity of runoff leaving the NH2CP.

Pond 1 accepts flow from the north half of the sector plan which is conveyed to the pond via traditional piped methods. Pond 1 releases flow at a controlled rate into the storm pipes that drain towards the second half of the commercial bio-swale. Pond 2 accepts the flow from the residential area designed to flow overland through a bio-swale system. The controlled flow from this pond is then released to the first section of the commercial bio-swale which ultimately flows through the second half of the commercial bio-swale and into Pond 3. Pond 3 also controls flow before releasing to the storm system outlined in the NEUA.

Pond 3 is located outside of the NH2CP but is identified in the NEUEA Sector Plan as the major pond servicing this area.

In case of a larger stormwater event that surcharges the storm pipe minor system, flow is directed through the street right-of-way and follows the same route outlined above.

The proposed stormwater management system is based on the NEUEA Sector Plan Report and the AECOM servicing letter. The proposed system connects to the overall sector stormwater system as intended in the NEUEA Sector Plan Report.

6.3 WASTEWATER MANAGEMENT

6.3.1 Background

The City of Swift Current has constructed Lift Station #10 at the south end of the NEUEA. Based on the NEUEA Sector Plan Report and the servicing letter issued by AECOM on July 15, 2015, the proposed development will drain toward Memorial Drive and connect to an existing 375 mm pipe which will direct flow to Lift Station #10. The current capacity of Lift Station #10 is 65 L/s. Based on the analysis in the NEUEA Sector Plan Report the total sanitary flow for the proposed

and existing lands that drain to Lift Station #10 is 135 L/s. Lift Station #10 will require upgrading before full development of the NEUEA.

A conceptual level layout for the sanitary sewer system has been developed, based primarily on the following information:

- NEUEA Sector Plan provided by AECOM;
- Servicing Development letter issued by AECOM dated July 15, 2015;
- Contour mapping based upon Stantec surveys; and
- City of Swift Current Design and Development Standards.

6.3.2 Conceptual Design

The grading of the proposed development was driven by the existing topography as well as the stormwater management requirements to provided adequate emergency overland drainage. The sanitary sewers were designed in order to maintain a minimum burry depth given the grading design of the site. All the flow has been directed toward the southeast corner of the NH2CP where it will travel along Memorial Drive to the existing 375 mm diameter stub at Saskatchewan Drive and ultimately Lift Station #10.

The sanitary demand is calculated from population densities for residential land uses based on the NH2CP. The average daily demand per capita for residential land as well as inflow and infiltration rates are outlined in the Swift Current Design and Development Standards. The flow rate, peaking factor, and infiltration and inflow rates for non-residential land uses are also outlined in the Swift Current Design and Development Standards. Table 6.4 summarizes the land uses and demand rate used.

Table 6.4 – Sanitary Sewer Demand

Land Use	Density (p/ha)	Average Day Wet Flow (L/day/p)	Average Day Wet Flow (L/ha/day)
Single Unit Detached Dwellings	56	450	
Low Density Street Townhouse	82	450	
Low Density Group Townhouse	139	450	
High Density Multi Unit Dwellings	159	450	
Residential Inflow/Infiltration		0.20 L/s/ha	
Commercial			40,000
Commercial Inflow/Infiltration			0.28 L/s/ha

A peaking factor is applied to each demand catchment based on the cumulative population and calculated using the Harmon Peaking Factor Formula for residential and a peaking factor of 3.0 for commercial land uses.

6.3.3 Flow Calculation Results

The results of the conceptual design for the sanitary sewer system indicate the NH2CP can produce a wastewater peak flow volume of 63.3 l/s. This analysis is based on the City of Swift Current Design and Development Standards and represents 2,530 people corresponding to a

population density of 40.8 persons per gross hectare. This calculation of gross area includes the parks, roads and commercial areas.

6.3.4 Sanitary Connections

The sanitary sewer main serving the NEUEA has been sized as a 375 mm diameter main. Based on the grading of the site and minimum cover depths the sector will be able to connect to the existing 375 mm diameter main at the intersection of Memorial Drive and Saskatchewan Drive as requested in the servicing letter issued by AECOM. An illustration of the sanitary network is shown in Appendix A.

The actual invert of the sanitary sewer main connection may vary based on the final grading designs of the site. As the system is currently designed there is approximately 0.8 metres of excess drop in elevation between the existing stub and the pipe servicing NH2CP.

6.4 WATER DISTRIBUTION SYSTEM

6.4.1 Water Distribution System Design Criteria

A conceptual water model of the secondary water main system for the NH2CP was completed as per parameters identified in the City of Swift Current Design and Development Standards.

The minimum fire flow requirements are dependent on land use values provided from the Swift Current Design and Development Standards and summarized below:

- 32 l/s @ 140 kPa for residential
- 32-63 l/s @ 140 kPa for multi-family residential
- 95 l/s @ 140 kPa for commercial/high density residential
- Velocities not to exceed 2.5 m/s under fire flow conditions

The model was analyzed with WaterCAD software by Auto Desk at a conceptual level. Fire flow was added to each of the individual nodes within the model under the Maximum Day Demand (MDD) condition.

Average Day Demand (ADD) was calculated in accordance with the NH2CP and the land use design values provided from the City of Swift Current Design and Development Standards.

Peak Hour Demand (PHD) and MDD were calculated for select nodes from multiplication factors provided by the City of Swift Current:

- PHD = ADD x 3.2
- MDD = ADD x 2.1

The system's normal operating conditions are as follows:

- Pressure: 280-700 kPa
- Velocity: Not exceeding 1.5 m/s

The system was evaluated for MDD, MDD plus fire flow, and PHD; and must meet normal operating conditions. Design of the system was based on a conservative total permanent population of 2,530 persons. Based on the design population, ADD is 14.02 l/s, MDD is 29.43 l/s, and PHD is 44.85 l/s.

6.4.2 Water Distribution System Concept

A proposed primary network of 250 mm diameter PVC piping following major roadways is recommended for design and construction purposes. All piping is to be looped to allow for proper water circulation and higher pressures and to reduce impacted areas if servicing is required. Dead ends have been minimized in the design process. Areas to the north and northeast show dead ends intended to connect to future developments.

All data and analysis was completed at a conceptual level. Detailed design has been completed on the water main network, including but not limited to the 150 mm distribution mains as well as fire flows for various levels of land use and flows through fire hydrants. As mentioned in the servicing letter issued by AECOM, boundary conditions will be provided prior to detailed design of the water supply network to confirm pipe sizes.

Based on the NEUEA Sector Plan Report, as well as discussions with the City of Swift Current, the current water supply system does not have the ability to service the proposed NEUEA. For this reason there was no connection information provided by the City and therefore the pipe sizing and modelling are not accurate. Until there is a design for water distribution system improvements, proper sizing and analysis of the system cannot be completed. Initial pipe sizing has been estimated and is illustrated in Appendix A.

6.4.3 Staging of Water Distribution Connections

The staging of the development has been designed to accommodate the municipal service connecting and to maximize opportunities for looping of watermain connections within the NEUEA.

7.0 IMPLEMENTATION STRATEGY OBJECTIVES

7.1.1 Phasing

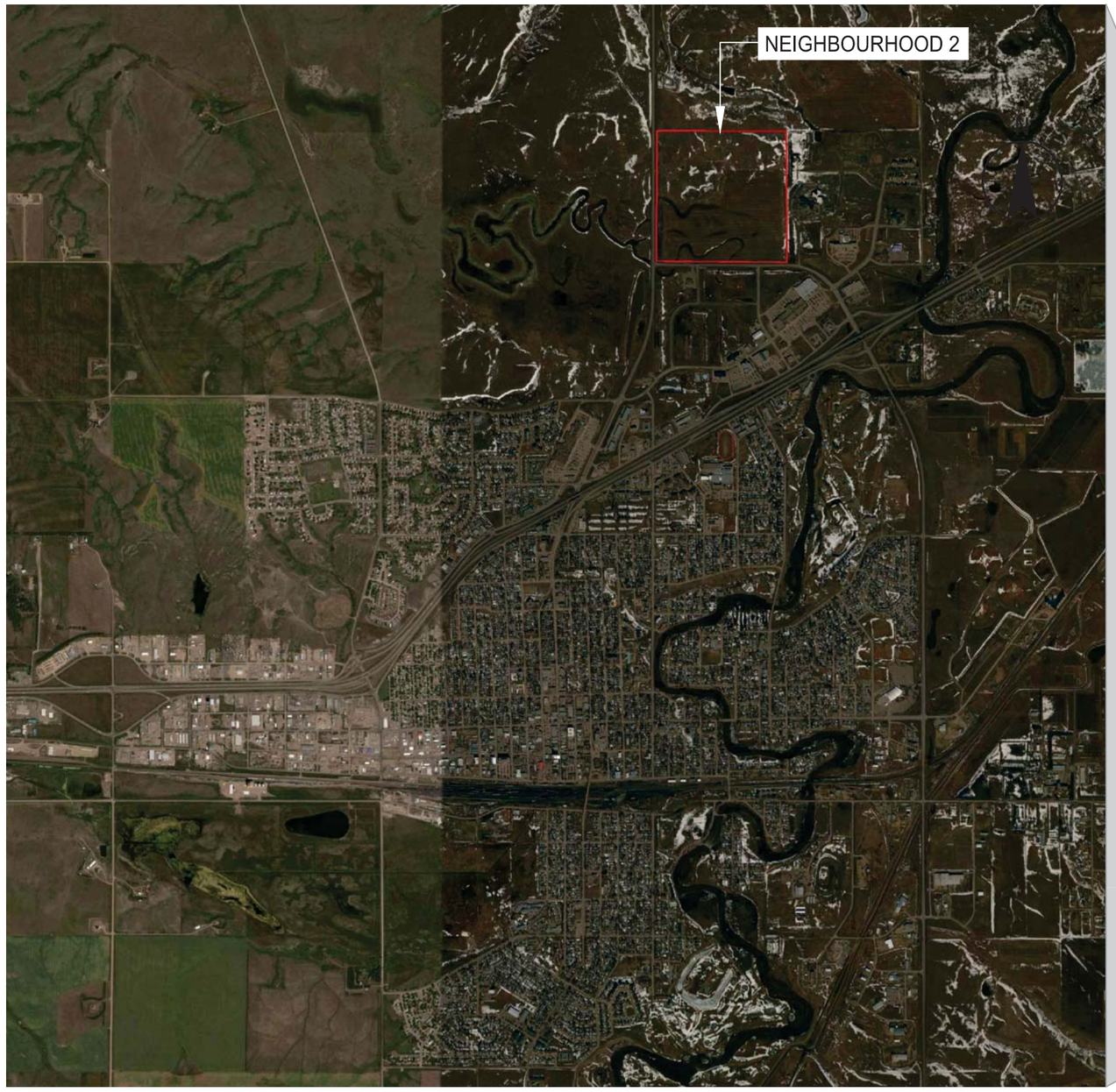
Development will expand north and west from the Memorial Drive and Springs Drive intersection. Phasing connections with utility services will progress simultaneously to ensure efficient staging and coordination with utility providers as development occurs. The phasing strategy is driven by the logical extension of infrastructure and the need to initially provide a mix of multi-unit dwellings and highway commercial sites. The Phasing Plan, found in Appendix A, is preliminary and subject to change.

8.0 PUBLIC CONSULTATION

Approximately 15 people attended the open house session at the Swift Current Mall on Thursday, June 16, 2016, between 4:00pm and 7:30pm. Information about Neighbourhood 2 in the Northeast Urban Expansion Area was displayed on presentation boards set up in front of the Safeway entrance. Stantec Consulting Ltd. and TerraTrust Inc. had representatives available to provide information, answer questions, and capture feedback from participants.

Comments regarding Neighbourhood 2 were inquisitive in nature and feedback was positive. Participants were interested in gaining more information about the neighbourhood including dwelling types, lot sizes, public amenities, commercial amenities, and timing of development.

APPENDIX A - FIGURES



Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #1
LOCATION PLAN

DRAWN BY: MK
CHECKED BY: DC
SCALE: NTS
PROJECT #: 113155060

FEBRUARY, 2016

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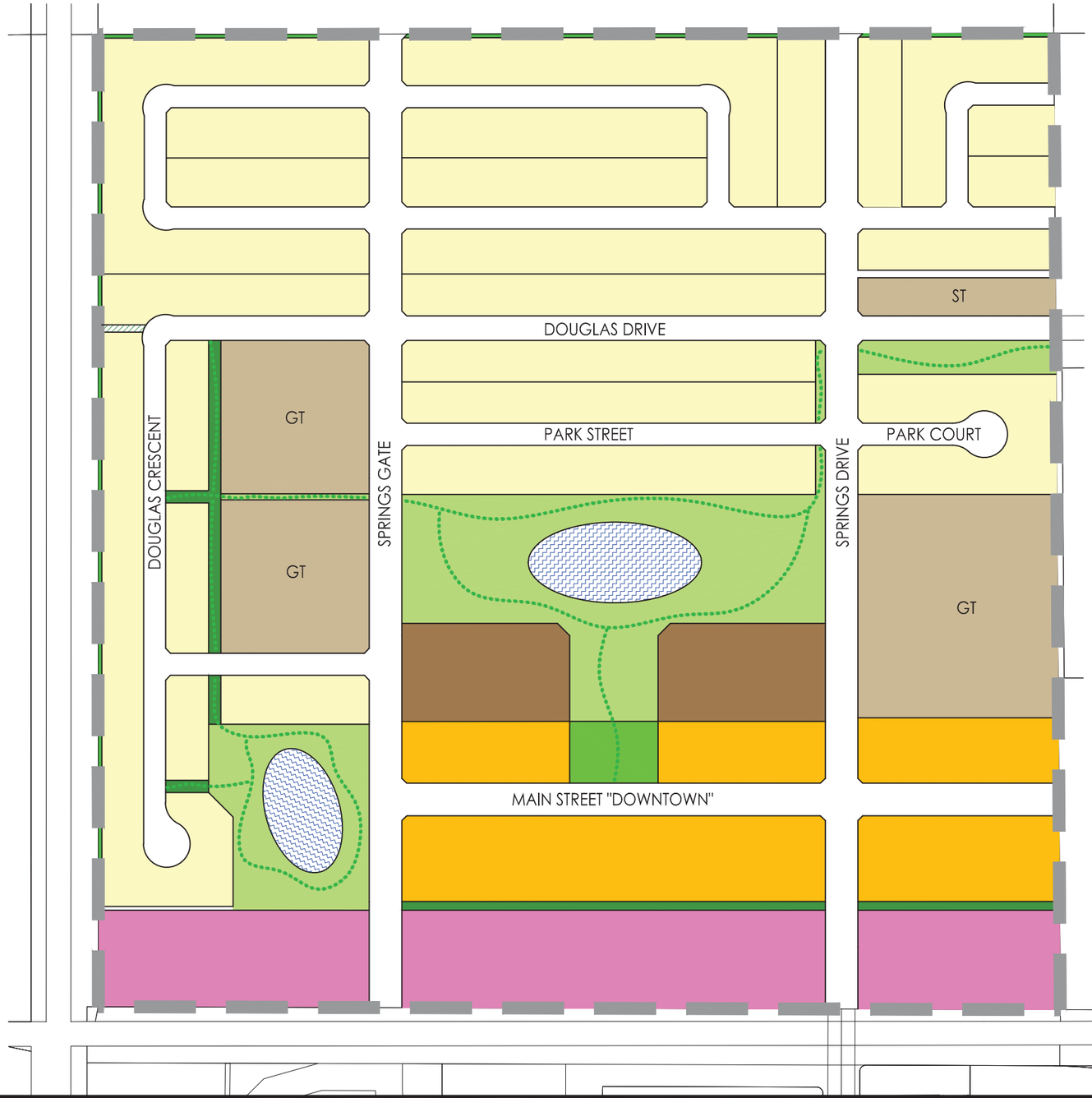

LEGEND

21.89 ha		RESIDENTIAL LOW DENSITY
0.50 ha	ST	LOW DENSITY MULTI-UNIT DWELLING (STREET TOWNHOUSE)
6.00 ha	GT	LOW DENSITY MULTI-UNIT DWELLING (GROUP TOWNHOUSE)
5.40 ha		MUNICIPAL RESERVE
0.72 ha		BIO SWALE
0.36 ha		PUBLIC SQUARE
1.22 ha		STORMWATER DETENTION AREAS
0.41 ha		BUFFER STRIP
11.81 ha		ROADS/ROW
5.85 ha		HIGHWAY COMMERCIAL
2.18 ha		HIGH DENSITY MULTI-UNIT DWELLING
5.82 ha		MIXED USE COMMERCIAL/INSTITUTIONAL/RESIDENTIAL
0.02 ha		UTILITY EASEMENT
62.18 ha		CONCEPT PLAN BOUNDARY

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #2
NEIGHBOURHOOD CONCEPT PLAN

DRAWN BY: MK
CHECKED BY: DC
SCALE: NTS
PROJECT #: 113155060

FEBRUARY, 2016

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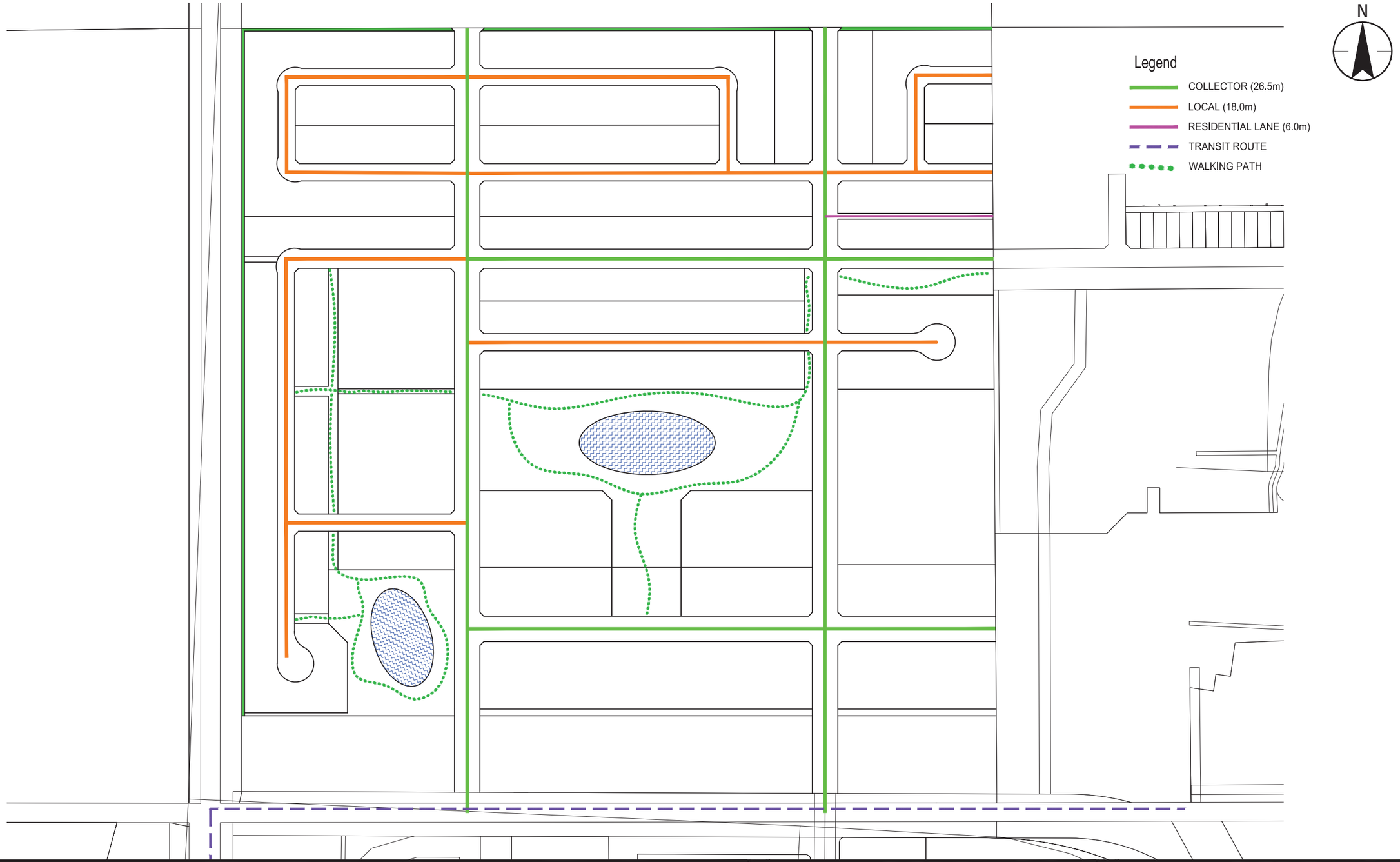

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #3
PROPOSED PHASE 2 NEUEA CIRCULATION PLAN

DRAWN BY: MK
CHECKED BY: DC
SCALE: NTS
PROJECT #: 113155060

FEBRUARY, 2016

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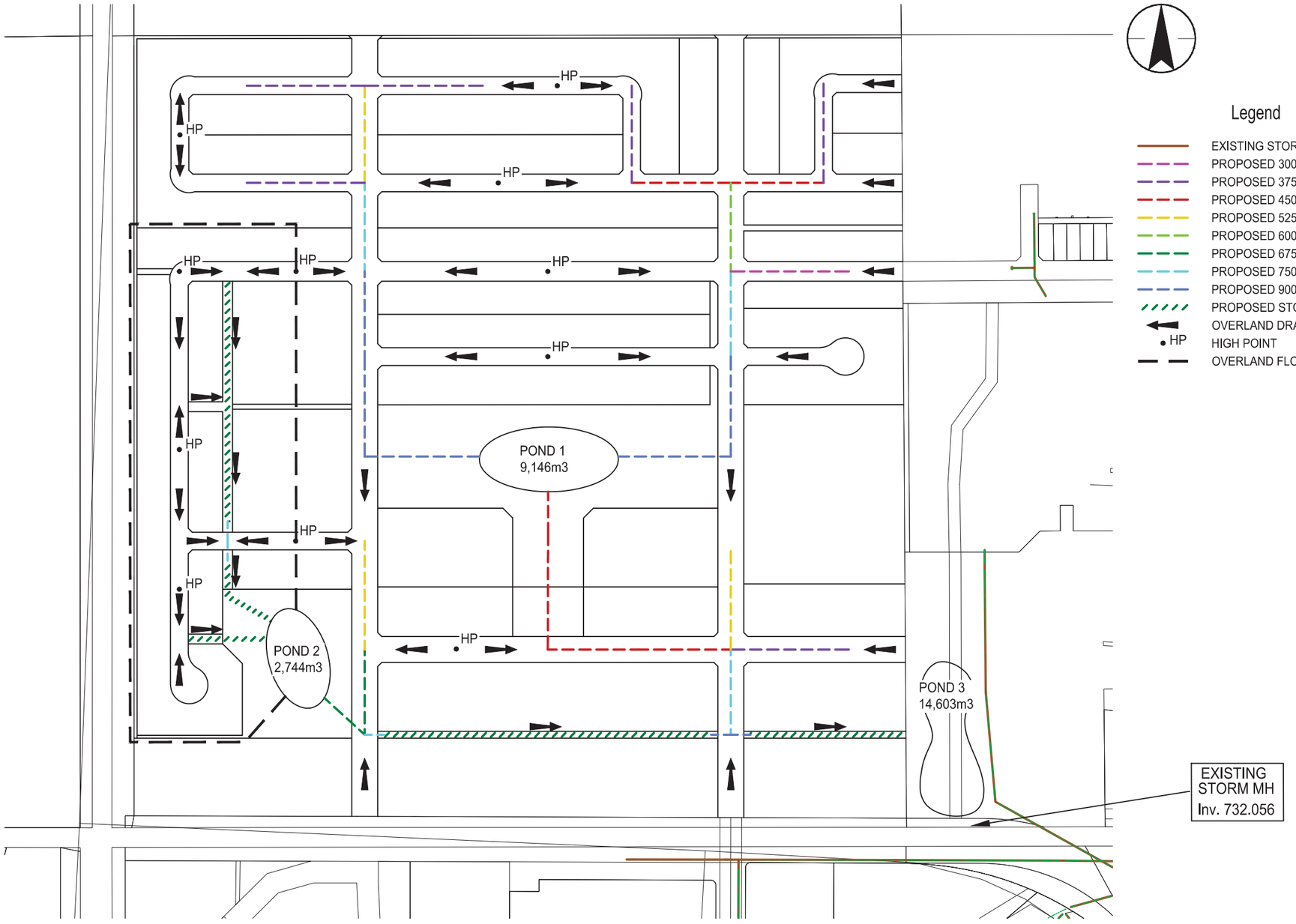

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #4
PROPOSED STORM SEWER SYSTEM

DRAWN BY: MK
CHECKED BY: GC
SCALE: NTS
PROJECT #: 113155060

FEBRUARY, 2016

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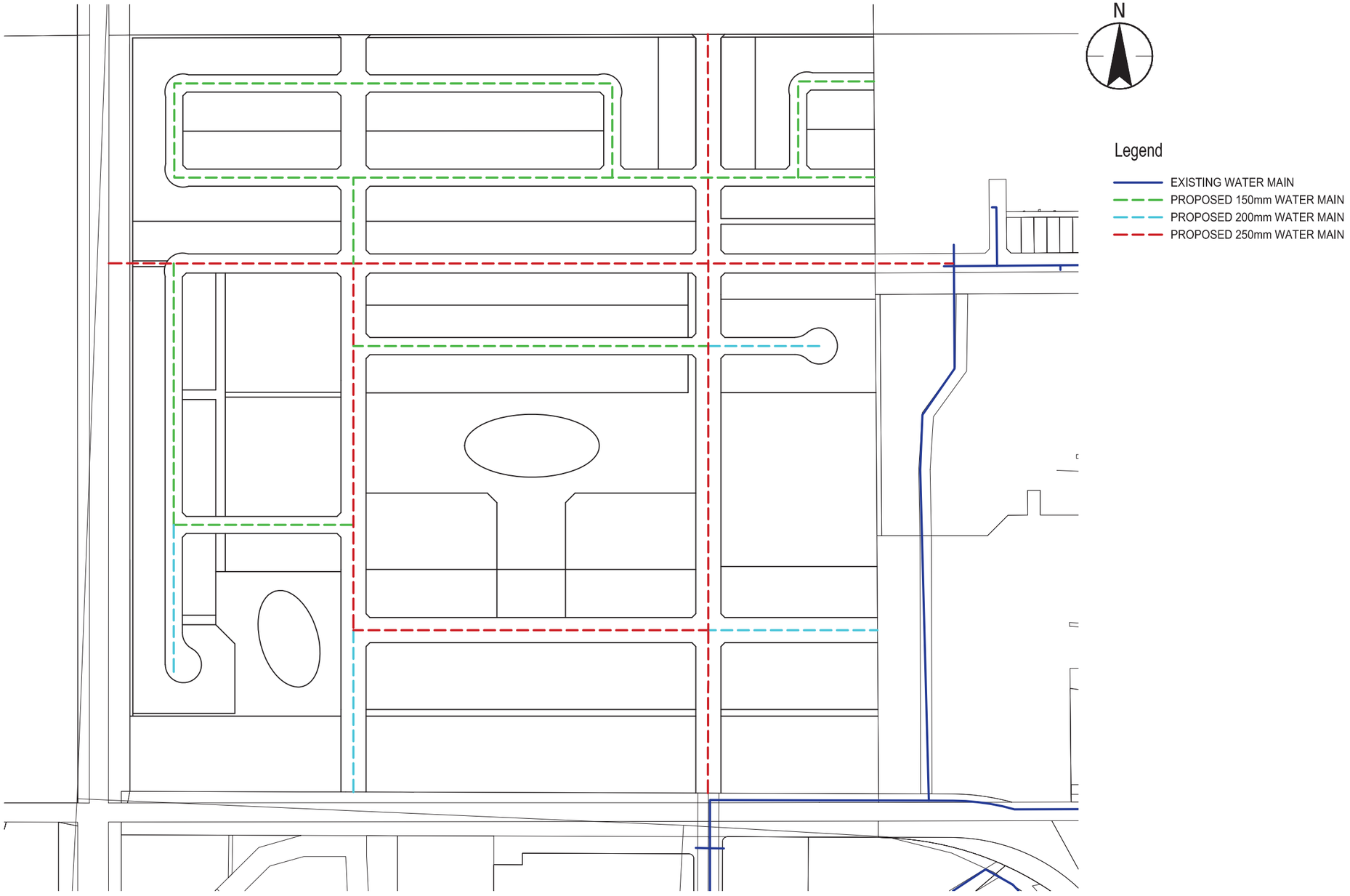

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #5
PROPOSED WATER SYSTEM

DRAWN BY: MK
CHECKED BY: GC
SCALE: NTS
PROJECT #: 113155060

FEBRUARY, 2016

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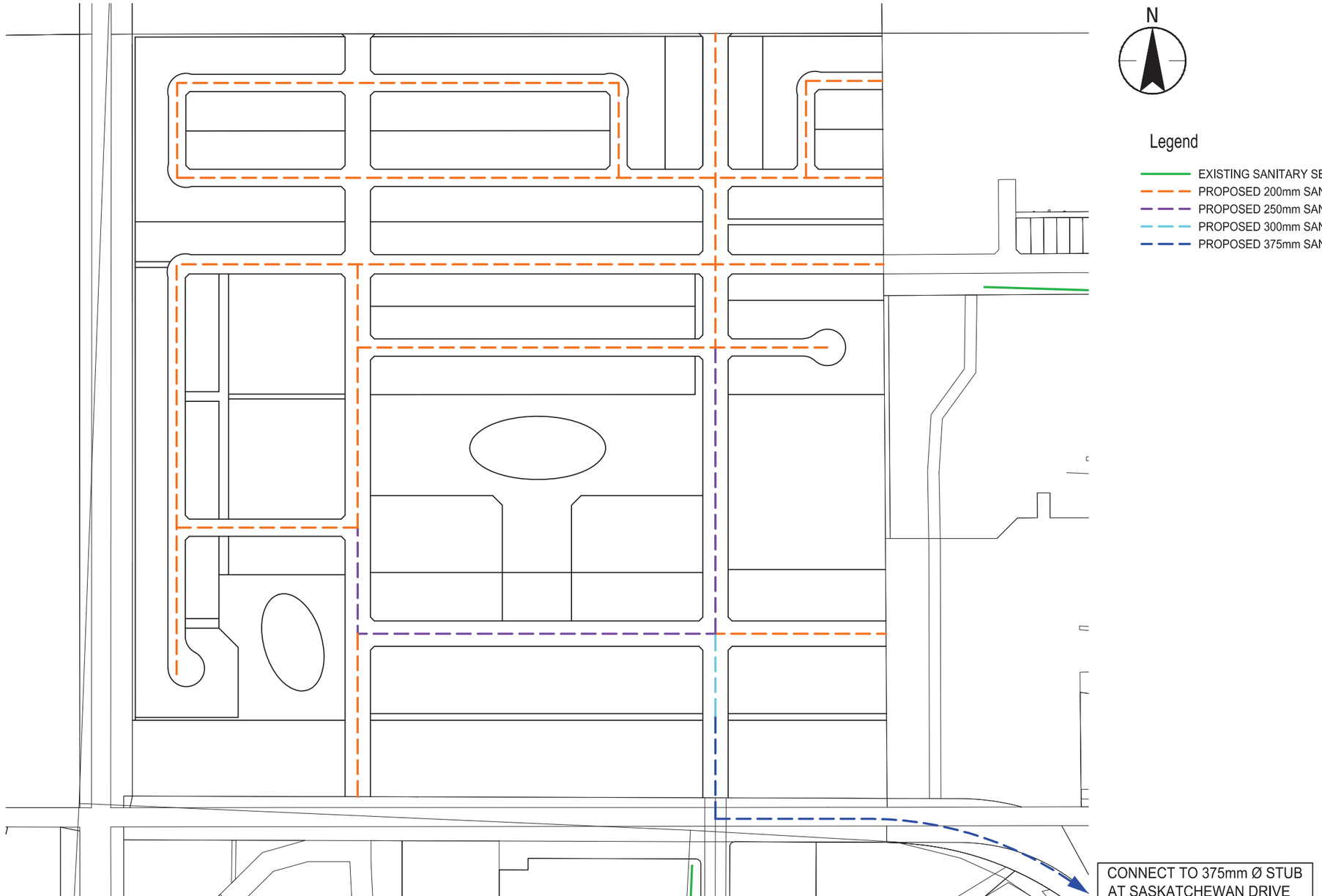

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #6
PROPOSED SANITARY SEWER SYSTEM

DRAWN BY: MK
CHECKED BY: GC
SCALE: NTS
PROJECT #: 113155060

FEBRUARY, 2016

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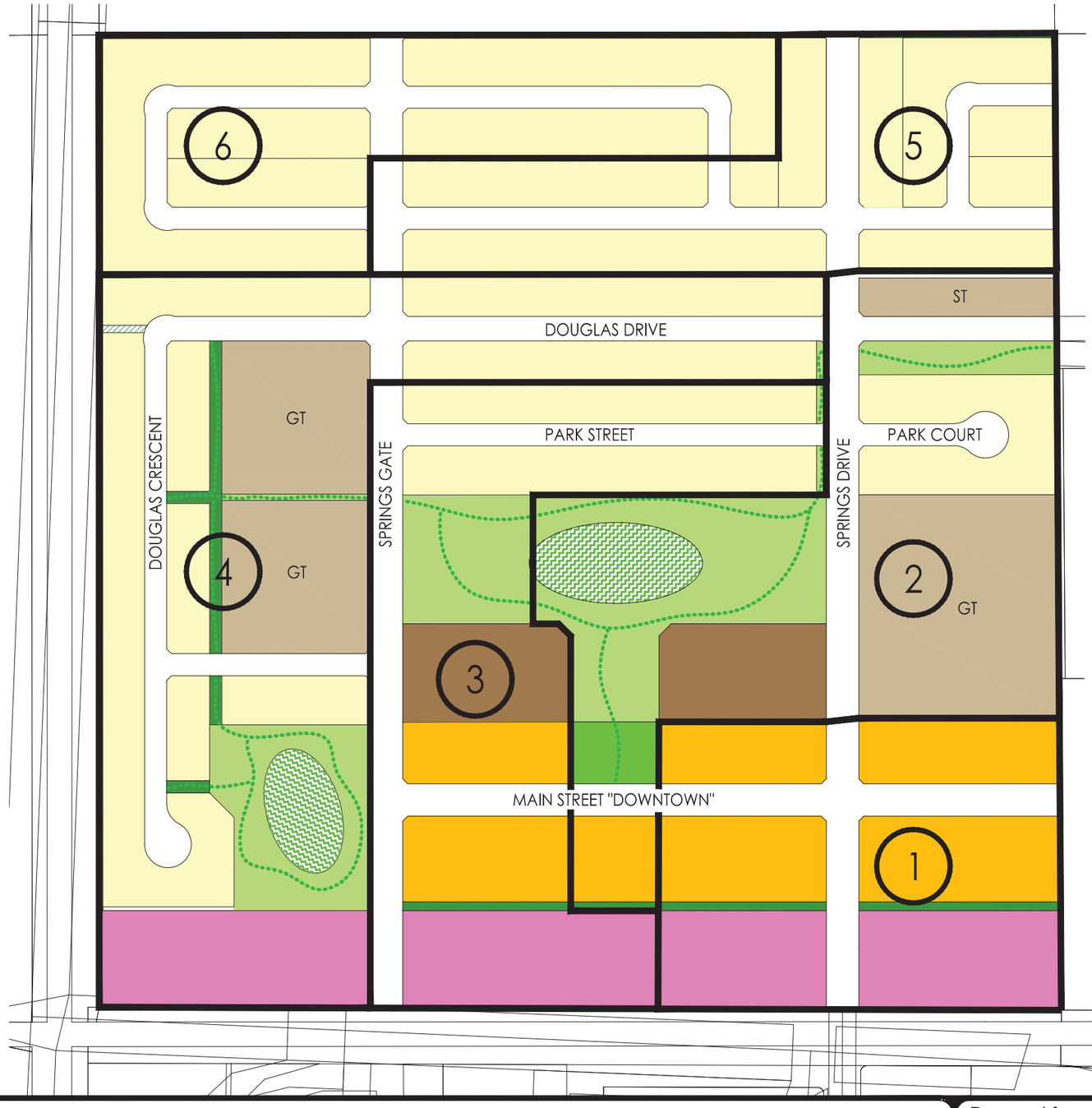
2/2/2016



LEGEND

21.89 ha		RESIDENTIAL LOW DENSITY
0.50 ha	ST	LOW DENSITY MULTI-UNIT DWELLING (STREET TOWNHOUSE)
6.00 ha	GT	LOW DENSITY MULTI-UNIT DWELLING (GROUP TOWNHOUSE)
5.40 ha		MUNICIPAL RESERVE
0.72 ha		BIO SWALE
0.36 ha		PUBLIC SQUARE
1.22 ha		STORMWATER DETENTION AREAS
0.41 ha		BUFFER STRIP
11.81 ha		ROADS/ROW
5.85 ha		HIGHWAY COMMERCIAL
2.18 ha		HIGH DENSITY MULTI-UNIT DWELLING
5.82 ha		MIXED USE COMMERCIAL/INSTITUTIONAL/RESIDENTIAL
0.02 ha		UTILITY EASEMENT
62.18 ha		CONCEPT PLAN BOUNDARY

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #7
PRELIMINARY PHASING PLAN

DRAWN BY: MK
CHECKED BY: DC
SCALE: NTS
PROJECT #: 113155060

FEBRUARY, 2016

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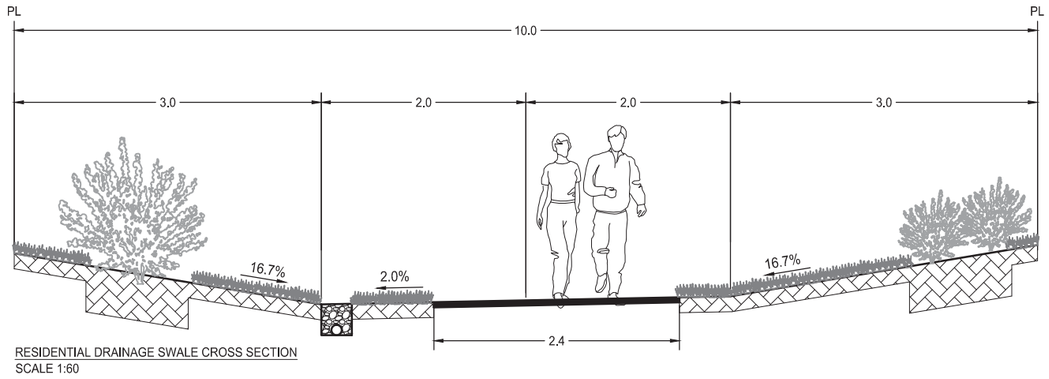
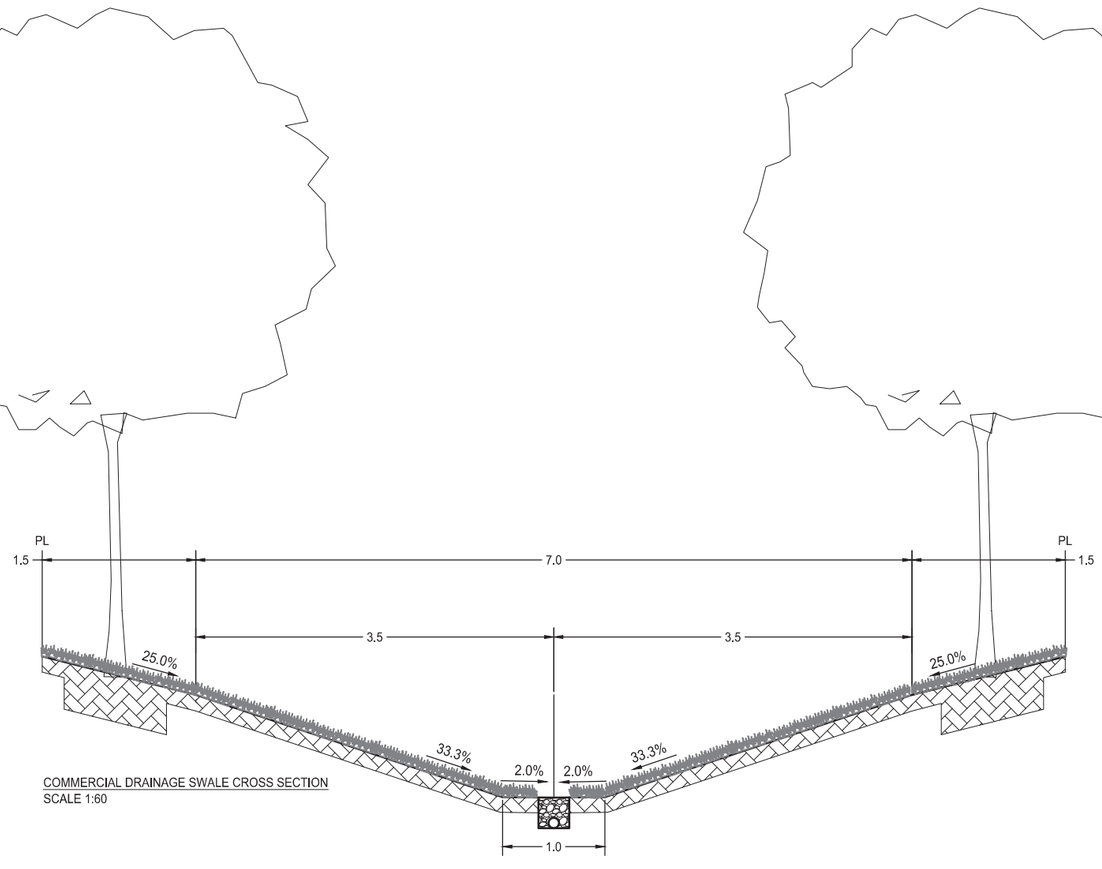


RESIDENTIAL DRAINAGE SWALE CROSS SECTION
SCALE 1:60



COMMERCIAL DRAINAGE SWALE CROSS SECTION
SCALE 1:60

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #8
SWALE CROSS SECTIONS

DRAWN BY: KC
CHECKED BY: AL
SCALE: AS SHOWN
PROJECT #: 113155060

APRIL, 2016

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pedestrian crossing .....

: 5m - water easement .....

: 7m - water and sanitary sewer easement .....

Neighbourhood 2 - Northeast Urban Expansion Area

TerraTrust Inc.

Prepared for: terratrust

Prepared by: Stantec

FIGURE #9
PRELIMINARY SITE PLAN FOR PARKING LOT

DRAWN BY: KC
CHECKED BY: AL
SCALE: AS SHOWN
PROJECT #: 113155060

APRIL, 2016

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